From: Ohl, Matthew
To: Pope, Janet; r5websupport
Cc: Thurlow, Timothy; Pina, Yvette
Subject: RE: Pines Site Rad Response
Date: Thursday, April 04, 2013 9:31:00 AM
Attachments: PINES 2012 Radiation Survey and Response FINAL 03 20 2013 optimized.pdf

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Good morning:
We need to have this March 20, 2013 response on the website. I optimized it to reduce its filesize if that helps.
Thank you.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
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March 20, 2013

REPLY TO THE ATTENTION OF:
SR-6J

Via Electronic Mail and Certified Mail
Return Receipt Requested

Paul Kysel, President
PINES Group
[redacted] Exemption 6

RE: Pines Site, Pines, Porter County, Indiana
Administrative Order on Consent Docket No. V-W-04-C-784

Dear Mr. Kysel:

Thank you for your e-mail of November 26, 2012 responding to the U.S. Environmental Protection Agency's letter of February 29, 2012 and providing the results of another survey conducted by PINES in October 21-26, 2012. EPA has reviewed this information and its comments are enclosed with this letter.

If you have any questions regarding this matter, please contact me at (312) 886-4442 or ohl.matthew@epa.gov.

Sincerely,

Matthew J. Ohl
Remedial Project Manager

Enclosure

cc via e-mail:
Kim Ferraro
Tim Thurlow, EPA-ORC
Janet Pope, EPA-CIC

Enclosure

These comments respond to the PINES e-mail of November 26, 2012, including a review of the U.S. Environmental Protection Agency's letter of February 29, 2012, and PINES radiological survey in the Town of Pines conducted October 21-26, 2012. For convenience, paragraphs or sections in the PINES response are addressed separately. The response is limited to the response and the survey and does not respond to documents not referenced in the Survey. EPA responses in bold font follow the PINES comments from "Comments on Review of Pines radiation survey," that are in regular font.

1. USEPA5 engaged a contractor with over 30 years of experience in environmental radiation, who is a member of the Health Physics Society, and who is certified by the American Board of Health Physics.

   PINES relied on a member with similar credentials: 28 years experience in environmental radiation, a member of the Health Physics Society for his entire career, and certified by the American Board of Health Physics. This member, Larry Jensen, worked at Argonne National Laboratory for 2 years and for USEPA5 for 25 years. Most of the latter time he was either the Regional Radiation Expert or the Superfund Radiation Expert. He was also the Regional Radiation Risk Assessor. Mr. Jensen was a member of the Health Physics Society committee that produced the American National Standards Committee / Health Physics Society standard, "Control and Release of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM)" [ANSI/HPS N13.53-2009]. TENORM may be the type of material associated with elevated radiation levels in the Town of Pines, Indiana.

PINES should clarify if Mr. Jensen is <u>currently</u> a member of the Health Physics Society (HPS) and is <u>currently</u> certified by the American Board of Health Physics (ABHP). The HPS is the professional organization whose membership includes individuals knowledgeable in environmental radioactivity and other areas of radiation protection. Our review of the HPS directory shows that Mr. Jensen has not been listed as a member of the HPS since the November, 2005 directory of members. Similarly, our review of the Certified Health Physicist (CHP) directory shows that Mr. Jensen has not been listed in the directory of CHPs which is dated July, 2007. The ABHP is the certification body for the practice of professional health physics. The ABHP requires evidence of continuing education to demonstrate that a certified professional remains current in the science and practice of Health Physics.

2. PINES does not wish to debate a minor issue about who calibrated the radiation survey meter. The radiation survey meter used in the PINES 2009 survey was rented from Auxier and Associates, a highly reputable, long standing, radiation survey company,

which would not have their instruments calibrated by any group they did not have full faith in. Moreover, Griffin Instruments calibration sheets state, "Calibrations performed to ANSI [American National Standards Institute] N323A-1997 standards," and "NIST [National Institute of Standards and Technology] Traceable Equipment and Standards Used During Calibration." Fundamentally, the calibration should be legally defensible.

EPA disagrees and believes the status of the instrument calibration, and who performed it is integral to data acceptability. The 2009 PINES Survey report lacked clarity on the rental and calibration of the instrument used.

3. The USEPA5 reviewer admonished PINES for not calibrating to the radionuclides of interest. This is a disjoint criticism. At this time no one knows the identity of the material giving elevated radiation readings in Pines. If and when these radionuclides are identified it may be appropriate to develop a more specific calibration.

   Calibration with cesium-137 is appropriate for an initial, exploratory, survey of this type and, in fact, it is common procedure. With cesium-137 there is a single, well defined, strong, gamma emission energy that can be correlated well with meter electronics. If radium-226 had been used, for example, there are so many gamma-ray emissions that there would be confusing interference.

Fly ash, as well as common soil and rocks, is known to contain naturally occurring radionuclides including uranium and thorium decay series radionuclides such as radium and radon. Additional information can be found on the internet, such as at an EPA website (http://www.epa.gov/radiation/tenorm/coalandcoalash.html) and a U.S. Geological Survey website (http://pubs.usgs.gov/fs/1997/fs163-97/FS-163-97.html).

The PINES individual had previously reviewed the Pines Site Remedial Investigation (RI) documents and provided comments with regard to naturally-occurring radionuclides that are commonly found in soil, rocks, coal and coal-combustion byproducts (CCBs).

Contrary to PINES stating that no one knows the identity of the material giving elevated radiation readings in the Town of Pines, the PINES Radiation Survey dated October 27, 2009, discusses specific radionuclides that commonly occur in soil, rocks, coal and CCBs. The PINES Survey has 15 instances where fly ash is identified as the local issue, and at least 16 instances where radium is mentioned.

The statements about cesium's single well-defined, strong gamma emission energy is meaningful if the survey is to measure radiation levels from cesium contamination. No correlation was established between the instrument response to a small Cs-137 point source at some distance from the detector and the instrument response to radium distributed in

soil as the 2009 PINES Report presumes. The statement that multiple energies will cause confusing interference would not be true with a calibration that corresponded to the planned use of the survey meter.

4. There are many reasons that calibration with the Illinois Emergency Management Agency (IEMA) radium blocks is inappropriate. Namely:

   (a) The material in the Town of Pines is not known to be radium. The causative material there has not been identified.

This statement is not consistent with the frequent mention of radium and fly ash in the PINES survey report. The statement also fails to recognize the known presence of naturally occurring radioactive material (NORM) or that the contaminants of concern were known by PINES from the RI and Human Health Risk Assessment that had been reviewed by PINES prior to the survey.

   (b) The sources used by IEMA are not calibration sources. They are intended to establish a relationship between field meter readings and cleanup concentrations so that cleanup decisions can be made immediately in the field rather than using time-consuming and expensive laboratory measurements. Mr. Jensen knows this well because he was part of the decision making group at USEPA5 that authorized use of these sources.

Depending on how the IEMA source blocks were used, individuals have viewed the source blocks as either constancy check sources or calibration sources. In either case they can be used to establish an instrument reading (in counts per minute, or CPM) relative to an action level for remediation.

   (c) It is not likely that a citizens group in Indiana would be granted access to a regulator's sources in Illinois.

It is disingenuous to suggest access would not be granted when access was never requested. EPA was not made aware of the study until the report was submitted. If PINES had submitted a request for access to the standards prior to the survey it's likely that access might have been granted.

   (d) If Illinois allowed access to their sources, it is probable PINES could not afford a fee.

PINES probably would not have been charged for access to the sources. EPA is not aware of anyone ever being charged a fee by the State of Illinois to access the sources. Issues

regarding access and fees could have been clarified if the PINES individual contacted EPA prior to conducting the survey.

5. The USEPA5 reviewer makes the following statement, "The survey does not include the type of analysis necessary to identify the radionuclides that might be present and the data presented in the Survey do not demonstrate that any specific radionuclides are present at concentrations distinct from background."

   PINES appreciates this statement from the reviewer as it agrees with the requests PINES has been making to USEPA5 since 2009.

The PINES statement that the survey does not include the type of analysis necessary to identify the radionuclides that might be present is a statement of fact as well. The report contains many instances where a reader can only conclude that PINES believes that naturally occurring radionuclides in fly ash and bottom ash is suspected to be what PINES refers to as the causative material.

(a) The meter selected was a seek-and-find instrument. It can find elevated radiation areas by a change in meter count rate. This is appropriate for a gross scan to locate radioactive material when the emitting radionuclides are not known.

The sodium iodide (NaI) detector used in the PINES survey measures the rate that incident gamma radiation interacts with the NaI crystal. In the absence of proper calibration and usage, NaI detector measurements should not be taken as an indication of gamma dose or the potential presence of an "elevated radiation area" that would otherwise typically be assessed using true dose rate or exposure rate instruments. The sodium iodide (NaI) detector used in the PINES survey is energy dependent with a response that varies across the gamma energies detected. The detector used by PINES may over-respond by a factor of 5 in the 100 keV range, and under-respond by a factor of 0.5 above 1 MeV when normalized to Cs-137 according to the manufacturer's manual; it does not exhibit a linear response across the range of gamma energies that it can detect. Unless calibrated to the radionuclides of interest, measurements with a NaI detector should only be viewed as qualitative in nature, especially at background levels.

Used appropriately with proper instrument calibration, and by applying knowledge about the naturally occurring radionuclides commonly found in materials such as soil, the PINES survey could have provided estimates of the concentrations of radium in soil. It did neither.

(b) The meter used cannot identify the causative radionuclides. This is not a flaw but simply a characteristic of seek-and-find instruments. Identifying the radionuclides

requires lab analysis from collected samples. Lab analyses can identify the radionuclide isotopes present and establish their concentrations.

Sample collection with lab analysis was performed as part of the Remedial Investigation for the Pines site. The lab results were then used in the Pines site Human Health Risk Assessment (HHRA). Further sample collection is expected as part of forthcoming Feasibility Study work.

(c) PINES was well aware they did not have the financial resources to have lab analyses done. The most they could do was to establish there were unusual levels of radioactivity at locations identified by the NIPSCO and Brown contractors as visually showing "Suspected CCBs" (Coal Combustion Byproducts) [see Figure 3-18 below]. In the PINES survey, elevated radiation levels were always associated with black, glittery material that is similar to bottom ash, a CCB. However, at this stage of data, there is no confirmation that there are CCBs or bottom ash present. The causative material may be something entirely different. This needs further investigation.

The data presented in the PINES Survey and the results of the Pines site Human Health Risk Assessment (HHRA) do not indicate a need for further radiological investigation because the measured levels are either similar to background or within the acceptable risk range. Additionally, the Pines site Feasibility Study will include additional investigation of residential properties in the Town of Pines to mitigate potential uncertainties regarding the findings of the HHRA.

(d) The best way to respond to this comment is for USEPA5 to collect samples and have them analyzed as PINES requested in 2009.

Samples were previously collected as part of the Pines site Remedial Investigation, and the Pines site Feasibility Study will include additional investigation to eliminate any potential uncertainties.

6. Initially, it should be explained that the natural environment, principally in rocks and soils, contains radioactive materials, mostly related to series of uranium and thorium isotopes and a single potassium isotope. These vary regionally and locally. Before initiating a survey, it is necessary to establish a radiation background in proximity of the site being investigated. This is commonly done, and was done by PINES, by selecting several areas that appear to be untainted within or near the region of interest and doing repetitive counts at a single spot in each area. PINES chose 3 background sites, one in an open grassy area and two in the woods. The detector was set on the ground and three

separate 2-minute counts were made without moving the meter. 2-minute counts were made to provide an average since normal radiation levels fluctuate.

PINES wishes to clarify how measurements were made at background sites as it seems the USEPA5 reviewer substantially misunderstood the process. Each of the three background sites was walked to gain a general idea of the levels and range of variation present. Count rates fell mostly into two groups, those about 3000 – 5000 counts per minute (cpm) and those about 10,000 cpm and above. The higher count rates were always associated with black glittery material. PINES was apprehensive that the black glittery material might be a contaminant and, thus, these areas did not represent untainted, natural environmental levels. No background measurements were taken where black glittery material was present. Background measurements were taken only in the low range areas. Thus, the report, to be comprehensive, stated all data measured in the area, but background measurements were only made where no black, glittery material was present.

Having established background, a statistical test for readings out of the background range can be used. When readings are more than twice background, the reading can no longer be assumed to be within the statistical range of background fluctuations.

Again, PINES appreciates the admonition by the USEPA5 reviewer, "Analysis of samples is necessary to determine radionuclide identity and if concentrations are present above background concentrations." PINES could not agree more and has been seeking this assistance from USEPA5 for three years.

The PINES report stated the background was measured in unaffected areas and then describes black glittery material on the unaffected area. If background varies, background should be averaged over the range. Using only lowest background measurements and the highest subject area measurements biases results. PINES fails to describe the statistical test that was used nor how to determine that twice background is a statistically significant result.

Using twice background as a determination of significant readings is flawed. If background is very low, 500 counts-per-minute (cpm), double background would be 1000 cpm, or only 500 cpm above background. If background is high, such as 3000 cpm, double background would be 6000 cpm, 3000 cpm above background. These two measurements of double background would result from very different concentrations of a radionuclide in soil.

Also, again, it should be noted that the detector used in the PINES survey is energy dependent, and may over-respond by a factor of 5 in the 100 keV range, and under-

respond by a factor of 0.5 above 1 MeV when normalized to Cs-137.

If an instrument is properly calibrated to correlate the instrument reading with concentrations of a radionuclide in soil, then a specific fixed number above background would correspond to an action level for the radionuclide.

7. Because the USEPA5 reviewer misunderstood the background data (explained above) the comment that the data for the investigation sites falls within the range for the background sites is incorrect.

   It should be noted, and this is reasonable, not all investigation sites showed elevated radiation levels.

PINES measured background areas and chose to use the lowest values although the measurements varied widely. PINES measured ranges of radiation levels in the subject areas and selected the highest values for these areas. This practice biases results. To be valid, survey results for background and subject areas must be selected and treated similarly to avoid bias and a flawed study.

8. PINES does not know the nature of the material causing elevated radiation readings. This is something PINES has sought assistance from USEPA5 to determine but we have not gotten that assistance as yet.

   Because investigation sites where readings were above twice background were always associated with a black, glittery, material, it is assumed this material might contain the excess radioactivity.

   Because bottom ash is a black, glittery, material it is reasonable to presume that the black, glittery, material at investigation sites is bottom ash.

   All the investigation sites where black, glittery, material was found are also associated with the visual identification of CCBs by ENSR, the contractor for the Potentially Responsible Parties, NIPSCO and Brown (see Figure 3-18 below).

   With the assistance of the USEPA5, the above observations could be validated or invalidated.

This section is internally contradictory. PINES says they do not know the nature of material causing elevated radiation readings. However, PINES goes on to say the elevated readings were always associated with the black glittery material reasonably presumed to be

bottom ash. Bottom ash and common soil are known to contain naturally-occurring radionuclides.

9. It is incorrect to say "The range of radiation levels in investigation areas never exceeded double the range of values observed in background areas,..." The average background level was 4722 cpm. Twice this is 9444. Investigation area levels ranged reached as high as 13,540 cpm (2 minute count).

First, as discussed above, EPA disagrees with the use of double background as a statistical signifier. Second, the elevated readings are associated with material thought to be bottom ash, but PINES did not calibrate to correlate the instrument response with radium correctly. On the one hand PINES believes the contamination is from bottom ash, but then did not use that information to complete a calibration to radium, the radionuclide commonly found in bottom ash. EPA disagrees with this approach.

10. It is correct that the survey did not explore human health pathways and establish risk levels. The purpose of the survey was only to determine if radioactive material was present. Indeed, results indicate elevated radiation levels. The necessary follow through should be to determine if a human health hazard is present.

    PINES separately attempted a human health risk assessment since Mr. Jensen had that role when he was employed by USEPA5. This was made very difficult by the lack of concentration data for the critical radionuclides in the Town of Pines. Only a few data were present from Yard 520 and that made for, admittedly, a weak risk assessment. If USEPA5 would assist in identifying the radionuclides in areas of elevated count rate and in establishing their concentrations, PINES feels a firm risk assessment could be accomplished. It should be recalled that the former Yard 520 USEPA5 remedial project manager, Tim Drexler, promised to use the maximum data for this assessment.

PINES states they did not explore human health pathways and risk levels. PINES failed to recognize that if the instrument used in the survey had been calibrated to correlate meter readings with soil contamination, PINES would have been empowered to make a reasonable estimate of the concentrations of radium in soil and to therefore estimate pathways and risk. In regard to the data used in the risk assessment, the Reasonable Maximum Exposure level was used.

11. PINES acknowledges that a typo was made in quoting the regulation. As the reviewer states, the regulation is in Title 40, Part 192, not Title 10.

    No data is available on soil concentrations in areas in the Town of Pines where NIPSCO's and Brown's contractor, ENSR, visually identified CCBs. At least two

samples from Yard 520 (and there is little of this data) as discussed in the HHRA (Human Health Risk Assessment) exceed the levels of 5 picocuries per gram plus background, total radium, cleanup criterion of Title 40, Part 192.12. It is not unreasonable to project there may be soil exceeding this criterion in the Town of Pines. The only way to confirm or refute this is for soil samples to be taken and analyzed. USEPA5 and/or the Indiana Department of Homeland Security and the Indiana State Board of Health have the resources to do this.

40 CFR 192.12(a) states a limit expressed as a concentration of radium in soil. Using an instrument correlated to soil concentrations is the correct calibration with which to estimate soil concentrations. With this information, PINES would have been able to perform risk estimates using models readily available from the EPA.

Further sample collection is expected as part of forthcoming Feasibility Study work.

12. With regard to drinking water measurements, USEPA5 stated that it intended to assure water in the Town of Pines met the USEPA drinking water standards. USEPA drinking water standards, in Title 40, Part 141.55, specify radioactivity levels. These must be part of the drinking water measurements.

Title 40, Part 141 establishes primary drinking water regulations applicable to public water systems.

***Maximum contaminant level* means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system; for radionuclides these are presented in Title 40, Part 141.66.**

***Maximum contaminant level goal* or *MCLG* means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are non-enforceable health goals; for radionuclides these are presented in Title 40, Part 141.55.**

It is generally understood that most drinking water sources have very low levels of radioactive contaminants ("radionuclides"), which are not considered to be a public health concern. Basic information about the radionuclides rule (Title 40, Part 141) can be found on the following EPA website:
http://water.epa.gov/lawsregs/rulesregs/sdwa/radionuclides/basicinformation.cfm.

13. PINES found that a risk assessment at this stage of data availability was difficult. If USEPA5 will obtain data in the Town of Pines, from the areas of elevated count rate, on

the radionuclides present and their concentrations, a solid risk assessment should be feasible.

A Human Health Risk Assessment (HHRA) was already conducted as a component of the Remedial Investigation/Feasibility Study process. The 2012 Human Health Risk Assessment (HHRA) for the Pines Area of Investigation was conducted using data collected as part of the Remedial Investigation (RI) Field Investigation, under the 2005 Field Sampling Plan, the 2004 Municipal Water Service Extension Sampling and Analysis Plan, and the 2005 Yard 520 SAP Sampling and Analysis Plan. The HHRA focused on CCB-derived constituents characterized during the RI.

Regarding radionuclide risk, the HHRA provided a radionuclide risk characterization scenario that assumes a residential lot contains 27% coal-combustion byproducts (CCBs) at the surface. For informational purposes, the HHRA also provided a hypothetical scenario that assumes 100% CCBs; in other words that soil is comprised of 100% CCBs. Risk receptors evaluated included residents, recreational children, recreational fishers, construction workers, and outdoor workers. In summary, potential risks greater than 10^{-4} are associated only with the hypothetical 100% CCB scenario.

Further sample collection is expected as part of forthcoming Feasibility Study work, and should eliminate any potential uncertainties.

14. PINES has no further comments on the review of Enclosure 2 for PINES Radiation Risk Estimate.